IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

***In re* Application:** **Jain et al.**	**Title:** **Method and Apparatus for Congestion Control in a Wireless Communication System**
Application No: 09/877,820	**Confirmation No.: 1176**
Filed: June 7, 2001	**Examiner: Lee, Andrew Chung Cheung**
Attorney Docket No.: 010296	**Group Art Unit: 2664**

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APPEAL BRIEF

This amended Appeal Brief is submitted in response to the Notification of Non-Compliant Appeal Brief (37 C.F.R. § 41.37) dated August 30, 2006. Appellants hereby petition for a two-month extension of time. The original Appeal Brief was filed on August 10, 2006 in support of the Notice of Appeal filed on May 1, 2006. Appellants appeal from the Primary Examiner's rejection of claims 1-16.

Real Party in Interest

The real party in interest is Qualcomm Incorporated, 5775 Morehouse Drive, San Diego, CA 92121.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

1. The total number of claims pending in the application is 16.
2. No claims have been canceled or withdrawn from consideration.
3. Claims 1-16 are rejected.
4. Claims 1-16 are on appeal.

Status of Amendments

Claim amendments made in response to the first Office Action dated December 30, 2004 have been entered. No claim amendments have been made after the final Office Action dated November 1, 2005.

Summary of the Claimed Subject Matter

Two independent claims among the 16 claims currently pending, namely, claims 1 and 13, are involved in this appeal. The summary of the subject matter for each of the independent claims is described below.

Claim 1

With respect to claim 1, a general description leading to the subject matter as claimed in claim 1 is first depicted.

A typical wireless system is generally shown in FIG. 1 and is signified by the reference numeral 100 which includes a plurality of cells 102A-102G arranged in a cellular fashion. Each of the cells 102A-102G has a base station. For instance, in the cell 102A, a base station 104A communicates wirelessly with mobile stations, such as the mobile station 106A. However, when too many mobile stations within a cell are operating at the same time, traffic congestion can occur. Reference is now directed to FIG. 4 which graphically shows parts of the inventive scheme to handle the traffic congestion problem. In the exemplary embodiment, the y-axis represents the power at the base station, such as the base station 104A shown in FIG. 1. The x-axis represents the time.

It is preferable to set a maximum power limit not to exceed in a base station. Such limit is labeled "DESIRED THRESHOLD" in FIG. 4. Nevertheless, to ensure there is always a margin of safety below the DESIRED THRESHOLD, the base station is normally operating around a level labeled "OUTER LOOP THRESHOLD" in FIG. 4.

At this juncture, a digression is made to clarify a few terms. These terms are well known in the art and are provided herein for convenience and ease of understanding.

The term "inner loop" refers to a communication loop which requires feedback between a transmitter and a receiver. For instance, a scheme in which the mobile stations individually feedback signals to the base station, so as to allow the base station to adjust the aforementioned thresholds is called an inner loop control. Otherwise, i.e., without such feedback, the control is called an outer loop control.

Forward link (FL) or downlink (DL) refers to a communication path from the base station to the mobile station. On the other hand, reverse link (RL) or uplink (UL) refers to the reverse communication path, i.e., from the mobile station to the base station.

The term Rise over Thermal (ROT) is a congestion measuring metric. In the exemplary embodiment, it is a ratio of power measurements. The "thermal" part relates to the power of the background noise. The "rise" part concerns with power used for active communications. Thus, the term ROT can provide a measure of the power utilization level of the base station.

Returning now to FIG. 4, the fluctuating solid line correlates to the instantaneous real-world value of a congestion metric, such as the ROT as mentioned above. In the exemplary example, the objective is to have the fluctuating ROT, if averaged out, to be as close to the OUTER LOOP THRESHOLD as possible. To accomplish this end, the base station constantly adjusts itself, by first comparing the congestion metric, such as the ROT, with the OUTER LOOP THRESHOLD level to arrive at a congestion indicator. The congestion indicator is thereafter sent to the mobile stations so as to allow the mobile stations to do their parts to alleviate or take advantage of the congestion situation, for example, via reducing or increasing the uplink data rates, respectively.

A highly congested base station is normally slow in response. Under a highly congested condition, if it is insisted that high data rate transmissions be maintained, data received are often corrupted or erroneous. The receiving party will then send requests for retransmission resulting in further overloading of the system (e.g., see ¶[1029] of Appellants' disclosure). The claimed invention, among other things, seeks to discriminatorily limit the data rate in the RL for the mobile stations, based on the data rate history and history of the congestion indicator of the mobile station. As such, a mobile station with a history of high data rate is required to reduce the data rate for the sake of more accurate data transmissions. Conversely, a mobile station with a history of low data rate is allowed to maintain the low data rate unless the history of the received congestion indicators requires otherwise. Lower communication data rates lead to higher

transmission accuracy with the consequential benefits of less incidents of requests for retransmission which in turn reduce further clogging of the congested system.

The method adopted by the mobile station is shown in FIGs. 5A and 5B and the relevant description in the specification (e.g, ¶¶[1043]-[1051] of Appellants' disclosure). For example, in FIG. 5A, the recited term "receiving a congestion indicator" can be found in the box 202. The other recited terms "data rate history" and the "history of the congestion indicator" in claim 1 can be found in decision diamonds 206 and 208, respectively.

Claim 13

The summary of the subject matter for independent claim 13 is substantially similar as above, i.e., in the description of claim 1. For the sake of clarity and brevity, such a summary is not further repeated.

Claim 13 is recited in means-plus-function terms as permitted under 25 U.S.C. § 112, sixth paragraph.

For example, the recited term "means for receiving a congestion indicator and determining a congestion condition therefrom" can be found in FIG. 8 and is labeled 602. The relevant description in the specification can also be found in the specification (e.g., ¶¶[1055]-[1056] of Appellants' disclosure).

The other recited term "means for determining a next data rate for the mobile station as a function of a history of congestion indicators and a function of data rate history of the mobile station" can be found in FIG. 8 in which the function of the congestion indicator is exemplified by the congestion bit counter 604. The function of the data rate history is shown by the comparator 606 comparing the data rate history and the target data rate in FIG. 8.

<u>Grounds of Rejection to be Reviewed on Appeal</u>

1. Whether claims 1-9 and 13-16 are unpatentable under 35 U.S.C. § 103(a) over *Bark et al.* (U.S. Patent No. 6,553,235, hereinafter referred as "*Bark et al.*") in view of *Yao et al.* (U.S. Patent No. 6,097,697, hereinafter referred as "*Yao et al.*").

2. Whether claims 10-12 are unpatentable under 35 U.S.C. § 103(a) over *Bark et al.*, in view of *Yao et al.*, and further in view of *Gilhousen et al.* (U.S. Patent No. 5,603,096, hereinafter referred as "*Gilhousen et al.*").

<u>Argument</u>

<u>Rejection of claims 1-9 and 13-16 as unpatentable under 35 U.S.C. § 103(a) over *Bark et al.* in view of *Yao et al.*</u>

<u>Claims 1 and 13</u>

Independent claim 13 is an apparatus recitation of the method claim of claim 1. Independent claims 1 and 13 are collectively argued hereinbelow. Prior to presenting Appellants' analysis, the references of *Bark et al.* and *Yao et al.* are first briefly described.

Bark et al. teaches the use of fast congestion control (FCC) in base stations to alleviate traffic congestion in a wireless communication system. Reference is now directed to FIGs. 1 and 3 of *Bark et al.* Each base station, such as the base station 140a (FIGs. 1 and 3), is installed with a FCC controller 310 (FIG. 3) which includes a congestion alarm 311 and a congestion relief controller 312. The overall power consumed by the base station 140a, called the DL power, P_{DL}, is constantly monitored. When the P_{DL} of the base station 140a exceeds a FCC alarm threshold, FCC_{AL_THRES}, the congestion alarm 311 alerts the congestion relief controller 312 to take regulatory actions (col. 4, lines 19-40). Such actions include reducing the DL power indiscriminatorily if

channels communicating with the mobile stations carry only speech packets (i.e., m=0 described in col. 7, lines 4-7), or selectively decrease the maximum DL power limit for all mobile stations if the channels carry only data packets, based on the rationale that data packets, as compared to speech packets, are more tolerant to errors. Under the FCC scheme of *Bark et al.*, each base station monitors and regulates its own P_{DL} by its own initiative, not by receiving any feedback from any mobile stations. Phrase differently, there is no signal sent to the mobile stations for reduction of data rate, nor is there feedback received from the mobile stations as inner loop control for regulating the P_{DL}.

Yao et al. concerns with peer-to-peer data transmission over a data network. Reference is now directed to FIG. 1 of *Yao et al.* When a node 110A (e.g., a computer) sends data to another node 110B (e.g., another computer) via a data network (e.g., the Internet), data congestion can occur. Data transmission in *Yao et al.* is via the Transmission Control Protocol (TCP) (col. 1, line 44 to col. 2, line 3 of *Yao et al.*). Under the TCP, after a number of data packets are sent, a sending party always receives acknowledgement messages from the receiving party regarding whether the data packets have been successfully sent. Unsuccessfully sent packets can always be resent by the sending party, based on the acknowledgement messages. *Yao et al.* tackles the congestion problem by implementing in each node a rate controller. For example, in FIG. 1, the node 110A has a rate controller 116. The sending party, such as the node 110A, knows the statistical failure rate of the data packets from the acknowledgement messages received from the receiving party, such as the node 110B, under the TCP. By processing the various data loss statistics, the rate controller 116 accordingly adjusts the data rate (e.g., col. 2, lines 22-25 of *Yao et al.*).

In the rejection, the Examiner basically contends that all limitations claimed by Appellants are found in *Bark et al.* but concedes that *Bark et al.* does not teach generating the next data rate in the mobile station as a function of data rate history and history of the congestion indicator received by the mobile station. Nevertheless, the Examiner refers to *Yao et al.* and alleges that *Yao et al.* teaches what *Bark et al.* lacks.

Appellants respectfully submit that the references are improperly combined. Among other things, the two references even if combined as suggested, do not meet Appellants' claims.

Bark et al. teaches congestion control carried out by a base station. That is, activities relating to congestion control are executed and originated from the base station (e.g., see FIGs. 5A-6 and the relevant paragraphs describing FIGs. 5A-6 of *Bark et al.*).

In contrast, Appellants' claims recite data rate adjustment by a mobile station. For instance, Appellants' independent claim 1 recites in the preamble "[a] method to determine a next data rate in a mobile station of a wireless system." Similarly, in independent claim 13, the preamble recites "[a] mobile station apparatus."

A claim preamble has the import that the claim as a whole suggests for it. *Bell Communications Research, Inc. v. Vitalink Communications Corp.*, 55 F.3d 615, 620, 34 USPQ.2d 1816, 1820 (Fed. Cir. 1995). Here, when Appellants' claim 1 is read as a whole, the steps of the claim body are more toward reading as carrying out by the mobile station and not by the base station. Likewise, when Appellants' claim 13 is read as whole, the different means recited in the claim body are more read as belonging to the mobile station apparatus and not other apparatuses.

Appellants' claim 1 goes on to recite, *inter alia*, the step of "receiving a congestion indicator." Similarly, Appellants' claim 13 recites, among other things, "means for receiving a congestion indicator."

Nowhere can there be found in either *Bark et al.* and *Yao et al.*, of any express or implied teaching of having the mobile station of "receiving a congestion indicator" as claimed in claim 1, or having the mobile station with "means for receiving a congestion indicator" as claimed in claim 13.

In the Final Office Action, the Examiner alleges that column 4, lines 18-20 of Bark *et al*. teaches that limitation (page 2, lines 5 and 6 of section 2 of the Final Office Action). However, detailed study of column 4, lines 18-20 of *Bark et al.* merely shows that the base station 140a has a FCC (Fast Congestion Controller) 310 which in turn includes a congestion alarm 311 and a congestion relief controller 312 (Fig. 3 of *Bark et al.*). There is no mention of any "congestion indicator." In fact, throughout *Bark et al.*, it is described that the congestion control is based on DL (Down Link) transmit power which the base station 140a continues to monitor by itself, not by "receiving a congestion indicator" or "means for receiving a congestion indicator" as claimed by Appellants.

Appellants are mindful that during patent examination, each claim term in a claim is given its broadest reasonable construction consistent with the specification. 37 C.F.R. § 1.56(b)(2)(ii). Here, putting other issues aside, for the sake of argument, assuming the "DL transmit power" in *Bark et al.* is construed as the "congestion indicator," as received by the FCC 310 (Fig. 3 of *Bark et al.*). The FCC 310 surely is not a mobile station. Quite the contrary, the FCC is clearly described and shown in Fig. 3 of *Bark et al.* as in the base station, not in a mobile station. As such, the "congestion indicator" in Bark et al. is not and cannot be construed as received by the mobile station, as claimed by Appellants. Accordingly, the references of *Bark et al.* and *Yao et al.*, even strainedly combined as suggested, do not meet Appellants independent claims 1 and 13.

Notwithstanding the overwhelming reasons in support of patentability as set forth above, Appellants further find no nexus whatsoever to have the two references combined. Nor is there any mention by the Examiner alluding to any teaching in the references for the combination. If there were, the Examiner would have so stated. In the Final Office Action, the Examiner provides the rationale for the combination of *Bark et al.* and *Yao et al.* with the following statement:

> It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify *Bark et al.* to include a (*sic*) [a] <u>generating the next data rate in the mobile station as a function of data rate history and history of congestion indicator of the mobile station such that taught by *Yao et al.*</u> in order to

> [b] provide features (*sic*) adjusting the transmission rate to the destination in response to a combination of derived statistics (as suggested by *Yao et al.*, see column 2, lines 27-29).

Here, Appellants underline and label two segments of the sentence as [a] and [b] for ease of explanation as will be apparent below.

As mentioned above, neither *Bark et al.* nor *Yao et al.* mentions any mobile station performing any data rate adjustment, much less having the mobile station "generating the next data rate" as alleged by the Examiner. Nevertheless, for the sake of argument, assuming the mobile station generates the next data rate as asserted. This assumption is unquestionably very favorable to the Examiner's contention because it is contrary to the facts on record.

Reference is now returned to the quoted statement above. It is a long sentence but basically can be broken up as including two parts, that is, one part being the consequence of the other. More specifically, the part underlined and labeled [b] after the transitional phrase "in order to" is stated as a purpose or problem; and the other part also underlined but labeled [a] and before the transitional phrase "in order to" is stated as a solution or means to tackle the problem.

To yet more succinctly put, according to the Examiner, at the time of Appellants' invention, a skilled artisan when faced with the problem of sending data with adjusted transmission rate (i.e., part [b] of the quoted sentence above), the obvious solution would have been to generate the data rate as a function of data rate history and history of congestion indicator such as taught by *Yao et al.* (i.e., part [a] of the quoted sentence above). Appellants further assume that the Examiner's statement, putting aside whether it is merely conclusory, is intended to show the motivation behind the combination of the references of *Bark et al.* and *Yao et al.*

In considering motivation in the obviousness analysis, the problem examined is not the specific problem solved by the invention but the general problem that confronted

by the inventor before the invention was made." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ.2d 1329 (Fed. Cir. 2006). Phrased differently, although the suggestion to combine references may flow from the nature of the problem, defining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness. *Ecolochem, Inc. v. S. Cal Edison Co.*, 227 F.3d 1361, 1372 (Fed. Cir. 2000), 56 USPQ.2d 1065

Here, the solution is what is claimed in Appellants' claims 1 and 13 (i.e., part [a] of the quoted sentence above) as part of the invention. The problem is what is pointed out by the Examiner in column 2, lines 27-29 of *Yao et al.* (i.e., part [b] of the quoted sentence above). As such, Appellants respectfully submit that the rejection is squarely based on impermissible hindsight.

For the foregoing reasons, Appellants respectfully submit that the Examiner's final rejection on independent claims 1 and 13 should be reversed. Claims 2-9 and 14 and 16 are dependent claims dependent upon their respective independent claims 1 and 13 and with additional limitations, are submitted to be, *a fortiori*, patentable for the same reasons claims 1 and 13 are believed to be patentable.

<u>Rejection of claims 10-12 as unpatentable under 35 U.S.C. § 103(a) over *Bark et al.* in view of *Yao et al.* and further in view of *Gilhousen et al.*</u>

Claims 10-12 are dependent claims either directly or indirectly dependent on independent claim 1, which is submitted to be patentable as set forth above. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071,1076, 5 USPQ.2d 1596 (Fed. Cir. 1988). Accordingly, the Examiner's rejection on claims 10-12 should also be overruled.

Conclusion

For all of the foregoing reasons, Appellants respectfully submit that the grounds of rejection of the claims on appeal are in error and should be reversed.

Respectfully submitted,

Date: November 14, 2006

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Claim Appendix

CLAIMS:

1. A method to determine a next data rate in a mobile station of a wireless system, comprising:

receiving a congestion indicator; and

generating the next data rate in the mobile station as a function of data rate history and history of the congestion indicator of the mobile station.

2. The method as in claim 1, wherein generating the next data rate further comprises:

comparing at least one previous data rate to a target data rate for the mobile station; and

in response to a first result of comparing determining the next data rate by adjusting at least one data rate.

3. The method of claim 1, wherein adjusting the at least one previous data rate performs a statistical analysis.

4. The method of claim 1, wherein generating the next data rate further comprises:

counting a number of consecutive same value congestion indicators; and

if the number of consecutive same value congestion indicators is less than a predetermined maximum number, determining the next data rate by maintaining the at least one previous data rate.

5. The method as in claim 4, wherein generating the next data rate further comprises:

if the number of consecutive same value congestion indicators is equal to or greater than the maximum number, determining the next data rate by adjusting the at least one previous data rate.

6. The method as in claim 5, wherein for a first congestion condition if the previous data rate is greater than the target data rate, adjusting comprises decreasing.

7. The method as in claim 6, wherein for a second congestion condition if the previous data rate is less than the target data rate, adjusting comprises increasing.

8. The method as in claim 1, wherein the next data rate is generated at the mobile station and is independent of other mobile stations.

9. The method as in claim 1, wherein the maximum number is predetermined.

10. The method as in claim 1, wherein the congestion indicator comprises multiple bits.

11. The method as in claim 10, wherein at least one of the multiple bits corresponds to a adjustment indicator, and at least one of the multiple bits corresponds a target indicator, the method further comprising:

for a first value of the target indicator, adjusting at least one previous data rate according to the adjustment indicator; and

for a second value of the target indicator, comparing at least one previous data rate to a target rate for the mobile station, wherein in response to a first result of comparing determining the next data rate by adjusting at least one previous data rate according to the adjustment indicator.

12. The method as in claim 11, wherein for a first value of the adjustment indicator adjusting at least one previous data rate according to the adjustment indicator comprises increasing at least one previous data rate, and

wherein for a second value of the adjustment indicator adjusting at least one previous data rate according to the adjustment indicator comprises decreasing at least one previous data rate.

13. A mobile station apparatus, comprising;

means for receiving a congestion indicator and determining a congestion condition therefrom;

data rate control means for determining a next data rate for the mobile station as a function of a history of congestion indicators and as a function of data rate history of the mobile station.

14. The apparatus as in claim 13, further comprising:

comparison means for comparing a previous data rate to a target rate for the mobile station,

wherein the data rate control means generates a next data rate by adjusting the previous data rate in response to a first result of comparing the previous data rate to the target data rate.

15. The apparatus as in claim 13, further comprising:

counting means for counting a number of consecutive same value congestion indicators,

wherein the data rate control means generates the next data rate by maintaining the previous data rate in response to a second result of comparing the previous data rate to the target data rate when the number of consecutive same value control indicators is less than a maximum number.

16. The apparatus as in claim 15, wherein the data rate control means generates the next data rate by adjusting the previous data rate when the number of

consecutive same value control indicators is equal to or greater than the maximum number.

Evidence Appendix

None.

Related Proceedings Appendix

None.